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16 December 1955

MEMORANDUM FOR: Director of Training

ATTENTION : Dr. Jacob Ornstein

SUBJECT : Mechanical Translation in England

1. In the LONDON DAILY TELEGRAPH AND MORNING POST for 1 December 1955, an article quoting an annual report of the Nuffield Foundation describes the research completed and contemplated at Birkbeck College, London, in the utilization of an electronic computing machine used as a mechanical translator. The report alleges that the machine has been successful in translating short passages in Arabic, French, Japanese, and nearly twenty other languages into English.

2. The responsible research officer, Professor J. D. Bernal of the Department of Physics, Birkbeck College, has been well reputed in the field of electronic computation. Dr. A. D. Booth, head of the computation lab, was recently appointed university reader in computational methods. He and his staff have developed a prototype machine in which a powerful logical notation has enabled the number of electronic tubes to be reduced to fewer than five hundred, a figure much below that of other computing machines. Research has already been done into the application of the digital computer for a variety of purposes such as structure analysis, x-ray crystallography, particularly in the protein field, and the solution of partial differential equations has been the basis of the research. However, several new projects are now under investigation and the most important of these is the utilization of the digital computer as a translator.

3. The first attempts to translate were of what is generally known as the mechanical dictionary type. Later on it was found to be more effective to separate the dictionary into two parts, one for stems and one for endings. This reduced the problem of dictionary storing space to one well within the machine's capacity. Preliminary surveys have suggested that if one thousand stems and the same number of endings

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were available, chosen as to relate to one subject such as biophysics, x-ray crystallography, plant genetics or neuro-surgery. The addition of about a one-thousand-word core would enable the machine to translate over 90 per cent of texts, according to the report.

4. The developers have decided that a word-for-word translation is unsatisfactory and that to solve the problem of word order, the syntax of the language must be investigated in detail and micro-glossaries and stem-ending dictionaries would have to be compiled and coded. As you know, this follows closely on [redacted] idea. The report goes on to say that the adaptability of the machine to tabulate alternative meanings and the possibility of achieving a literary quality in the end product are now being investigated. A very matter-of-fact statement appears, "a satisfactory way of handling idiom has already been evolved". Because we have never been able to train human brains to deal with linguistic idiom, it is my belief that these researchers are overly optimistic.

5. The ultimate goal of the machine is to be able to translate three thousand words an hour. This rate of translation does not impress me greatly in view of our own plans which would call for a machine capability of several powers of ten greater rate.

6. The research on the translating machine has stimulated work along further projects such as those we know of at the Bureau of Standards. For example, the recognition of texts by the machine, again quoting from the statement, "enabling the computer to read or take dictation".

7. The Birkbeck College is to receive £ 7200 from the Wuffield Foundation.

[redacted]
Assistant to DD/I (Planning)

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